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The Effects of Social Motives on Behavior in Social Dilemmas in Two Cultures

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Subjects in Santa Barbara, California, and Groningen, The Netherlands, participated in a seven-person social dilemma game, presented in terms of a conservation of resources problem. Prior to their decision making in the social dilemma game, subject's social motive (altruistic, cooperative, individualistic, competitive) was assessed by means of two different classification procedures. On the basis of previous research findings American subjects were expected to display relatively more competitive social motives, and Dutch subjects relatively more cooperative ones. However, no indications of crosscultural differences were found neither with regard to the distribution of social motives nor with regard to the amount of resources taken for self in the social dilemma game. In both locations, competitive subjects took most resources for self, individualistic subjects took next most, cooperative subjects took less than individualists, and altruistic subjects took the least. In addition to predictive validity, indices of the convergent validity of two social motive assessment procedures were described.

During the forest fires in southern California in autumn 1980, the fire department asked residents living in the threatened areas not to soak their houses and property; otherwise, there would not be enough water pressure for the fire department. The conflict in this emergency situation is that the individual resident's immediate benefit, presumably saving his or her own house, directly opposes the collective benefit for the threatened area, namely, eliminating the threat of fire for all residents. Moreover, the gain obtained from the selfish act—using water—is realized only by the person himself or herself, while the harm resulting from this act—loss of water pressure—is shared by all persons involved, including the

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actor. Hence, an individual resident may be inclined to use water. However, if everybody acts this way, the result is that the water pressure will, as a consequence, decrease to such a level that the individual residents cannot soak their houses and, moreover, the fire department cannot extinguish the fire, a tragic result for everybody. Hence, the people in the threatened areas faced what has come to be known as a social dilemma.

It is likely that not everybody would react in the same way to such social dilemma situations (Dawes, 1980; Hardin, 1968). Some people possibly would care only about their own short-term benefit, and soak their houses, while others would take the long-term, collective interest into account by not using water. In general terms, people may have different preferences for distributions of benefits among themselves and others. In the literature about behavior in situations of social interdependence, these preferences are called social motives (McClintock, 1972), interpersonal motivations (Griesinger & Livingston, 1973), motivational orientations (Kuhlman & Marshello, 1975a, 1975b), or value orientations (Liebrand, 1983). Here, the expression "social motives" will be used.

McClintock, Messick, Kuhlman, and Campos (1973), among others, have assumed that "much of the choice behavior occurring in situations of social interdependence is in the service of . . . three major social motives: (a) maximizing own gain, (b) maximizing joint gain, and (c) maximizing outcomes relative to the outcomes of others (relative gain)" (p. 572). The first two goals can be respectively labeled as "individualism" and "cooperation," the third as "competition." In addition to the above three social motives, Kuhlman and Marshello (1975a, 1975b) found a fourth group of subjects who appeared to be maximizing others' gain ("altruism"). More recently there have been some approaches which suggest an even finer discrimination of social motives (Knight & Dubro, 1984; MacCrimmon & Messick, 1976; Radzicki, 1976). These approaches use linear and nonlinear combinations of subject's preferences for own and others' outcomes. In the present study, however, the broader distinction into four classes of social motives will be sufficient.

Different procedures have been used for measuring social motives. As Knight and Dubro (1984) point out, most of the early measures were based on the observation of social interaction in small groups. However, in order to minimize the role of group processes and strategic behaviors, more recently measurement techniques using Decomposed Games have been used (Griesinger & Livingston, 1973; Knight & Kagan, 1981; Kuhlman & Marshello, 1975b; Liebrand, 1983). The person's task in a Decomposed Game is to select the most preferred of n own/other outcome distributions. Each distribution affords a payoff to the chooser and to another person. Generally, the other person's choices remain unknown to the chooser,

so that considerations of strategy can be avoided (Messick & McClintock, 1968).

In the present study the predictive validity of the social motive measures is examined by investigating the decisional behavior of subjects with different social motives in a simulated social dilemma called the Sequence Dilemma (Liebrand, 1983).

In this task, each individual in a group of seven subjects can privately take resources out of a common pool on five successive trials. The subjects get to keep the money they take so long as the total amount requested by the seven subjects does not exceed the amount in the pool. In that event the subjects get nothing.

The Sequence Dilemma is clearly a social dilemma. Taking a great deal of money from the resource pool is in the individual's short-term interest, while the collective, long-term interest requires moderation in order to remain within the limit.

The predictive validity of social motive measures can be assessed by comparing subjects' behavior in the Sequence Dilemma to their measured social motives. Only one previous study (Liebrand, 1984) reported an effect of social motives on choice behavior in an *n*-person game and that study used only one measurement technique in one location. The present study can be regarded as an extension of the Liebrand (1984) study. It is expected that the amount of money taken for self in the Sequence Dilemma is least for altruists, next lowest for cooperators, higher yet for individualists and greatest for competitors. The prediction concerning the order among the altruists, cooperators, and individualists is straightforward. The difference between the individualists and competitors might be less clear. It is expected that individualists would take less than competitors because the risk of exceeding the limit, resulting in zero payoffs to all group members, would be more aversive to individualists than to competitors. Hence individualists should exercise more restraint.

In the present research, the distribution and predictive validity of social motives in the Sequence Dilemma will be investigated in two samples of subjects drawn from two different social milieus: one sample out of the subject population available at the laboratory in Groningen, The Netherlands, the other from the United States.

Intuitive comparisons of the American and the Dutch societies would probably classify the American society as the more competitive and the Dutch society as the more cooperative. Although the research findings are not conclusive, support for this stereotype can be found from two different lines of research. The first contains studies in which an explicit American–Dutch contrast is employed (Kelley et al., 1970; Kerlinger, 1978; Kerlinger, Middendorp, & Amon, 1976). The second contains social motive studies employing either American or Dutch subjects. Unfortunately, these latter studies used two different procedures for the assessment

of social motives, one procedure for the American subjects and the other for Dutch subjects. The study described here integrates both lines of research. It contrasts an American student sample with a Dutch student sample and it employs, for both samples, both of the previously mentioned procedures for assessing social motives. In addition to the research question pertaining to the predictive validity of the two assessment procedures, their convergent validity is also analyzed.

Cross-cultural Research Findings

Thus far two relevant studies have been conducted in which an identical research format was presented to American and Dutch subjects (Kelley et al., 1970; Kerlinger, 1978; Kerlinger et al., 1976). Kerlinger (1978) compared, among other subgroups, an American student sample and a Dutch student sample. The American students were more conservative and less socialistic as measured by a basic social attitude scale. In the second study, Kelley et al. (1970) investigated negotiation behavior in a mixed-motive situation. The study was conducted at three European and five United States laboratories. One of the findings was that pregame ratings of "typical player" and "self in the game" on the bipolar scale "cooperative–competitive" had different connotative meanings across the laboratories. That is, in four of the five United States laboratories the cooperation–competition dimension was given a "dynamism" meaning: weak and passive versus strong and active, respectively (cf. Osgood, Suci, & Tannenbaum, 1957). Of the three European laboratories, both at the Belgian laboratory and at the French laboratory this dimension was given an "evaluative" meaning: good versus bad, respectively. The data from the Dutch laboratory revealed no substantial loadings on either factor, indicating thereby a possible difference between the United States and the Dutch sample in the meaning given to the cooperation—competition dimension.

Kerlinger (1978), Kerlinger et al. (1976), and the Kelley et al. (1970) study have the advantage of a highly similar experimental task for American and Dutch subjects. However, the findings have to be interpreted cautiously. In the Kerlinger et al. (1976) study the Dutch student sample consisted largely of politically left-oriented students. In the Kelley et al. (1970) study different recruitment procedures were used for the various subject samples. Consequently, between-sample differences are confounded with possible between-recruitment differences, differences in political orientation, age, and socioeconomic background.

The second line of research consists of studies in which the assessment of social motives by means of Decomposed Games was part of the experimental procedure. Liebrand and De Hullu (1981) have reviewed studies conducted either in the United States or in The Netherlands, in which two different Decomposed Games procedures were employed to

assess social motives. Six studies were examined, four conducted in the United States and two in The Netherlands (see Table 1). Even acknowledging objections against comparing the U.S. data with the Dutch data, it appears from Table 1 that the percentage of American subjects classified as cooperative is about half the percentage found for the Dutch subjects. More subjects appear to be classified as either altruistic or competitive in the United States than in The Netherlands.

It is possible that the cross-cultural differences in Table 1 are due to different experimental procedures used in the measurement of social motives. All the U.S. studies used a procedure developed by Kuhlman and Marshello, whereas the Dutch studies used a geometric procedure (Liebrand, 1984). This possibility can be tested by giving both procedures to subjects in both cultures. The two groups of studies also differed in recruitment procedures. The U.S. studies used volunteer subjects and the Dutch studies used paid subjects.

In the present study, we hope to determine if the distribution of social motives in an American sample differs from that in a Dutch sample when holding constant the measurement and recruitment procedures and second, whether the same relationship between social motives and choice behavior holds in both samples.

METHOD

Subjects

Subjects, 270 volunteers responding to an advertisement in a local university newspaper, were recruited from the local university population at Santa Barbara, California (56 males, 75 females, mean age = 21.9) and from the local university population at Groningen, The Netherlands (66 males, 73 females, mean age = 21.5). Subjects were randomly assigned to 40 decision-making groups, each group consisting of either six or seven persons. They

TABLE 1

PERCENTAGES OF SUBJECTS CLASSIFIED AS "ALTRUISTIC," "COOPERATIVE," "INDIVIDUALISTIC," OR "COMPETITIVE" BY MEANS OF CHOICES IN A SERIES OF DECOMPOSED GAMES

	Study[a]					
	Kuhlman (1975a)	Kuhlman (1975b)	Kuhlman (1976)	Poppe (1980)	Liebrand (1981)	Liebran (1983)
Altruistic	9	11	11	18	4	5
Cooperative	17	28	30	15	45	53
Individualistic	23	26	26	11	27	29
Competitive	28	21	18	12	10	10
Other	23	14	15	44	14	4
Total number of subjects	205	167	128	98	132	122

[a] The studies by Liebrand were done in The Netherlands; all others were done in the Unite States.

were not allowed to discuss the dilemma. Subjects received the total amount of money they had chosen in the Sequence Dilemma only if the requirements were met, otherwise the American subjects received a consolation payment of $1.50 per hour, the Dutch subjects received fl 3.

One of the possible interpretations for the distributional differences in social motives obtained between the United States and The Netherlands (Table 1) is the type of Decomposed Game procedure used at both locations. In order to investigate this explanation, a multimethod design was used. The subject's social motive was assessed by means of two independent Decomposed Game procedures, i.e., the modified Griesinger and Livingston procedure used in the European studies in Table 1, and the Kuhlman and Marshello (1975b) procedure used in the four American studies in Table 1. These will be described presently.

Procedure

In order to increase the procedural comparability, the first author was the principal experimenter at both locations. The extensive instructions for both the Decomposed Game procedures as well as for the Sequence Dilemma procedure were presented in writing to the subjects. In the rare case when oral instructions were required, for example, "please make your choices for the first stage," the subjects were addressed by a native-speaking research assistant.

During the first part of the session, subjects were seated so that they could not see each others' response sheets. In a counterbalanced design, subjects received instructions for the two Decomposed Games procedures, instructions that thoroughly explained how the subjects' outcomes were determined by both their own choices and the choices of another subject. The other subject was identified only as a person who would remain unknown and who had been randomly selected, separately for each Decomposed Game, out of the subject population to which they belonged themselves. Instructions were kept neutral. No reference was given concerning the desirability of obtaining specific outcome distributions.

Kuhlman and Marshello's Decomposed Game procedure. Kuhlman and Marshello's procedure consists of two identical sets of 12 three-alternative Decomposed Games, designed to assess the social motives "altruism" (A), "cooperation" (J), "individualism" (I), and "competition" (R). Each Decomposed Game is one of the following four types: 1: a-IR, b-JA, c-N; 2: a-IJA, b-R, c-N; 3: a-I, b-R, c-JA; 4: a-IRJ, b-A, c-N. The notation indicates the dominant alternative with respect to a social motive. For example, the a-IR, b-JA, c-N type indicates that individualistic and competitive motives lead to the selection of alternative a, that alternative b is dominant for cooperative and altruistic motives, and that alternative c is supposed to be neutral (N) to each of the social motives. Except for one game, the numerical outcomes of all the 24 Decomposed Games can be found in Kuhlman and Marshello (1975b). The numerical outcomes of alternative c in the game: self: a-90, b-70, c-60; other: a-10, b-20, c-20, were changed into self: c-60, other: c-10, so as to make alternative b dominant with respect to altruism.

Following Kuhlman and Marshello (1975b), subjects were paid a small amount of money based on the total number of points they accumulated as a result of their choices. They received 5 U.S. cents for each 100 points; the maximum amount of money paid for participating in the Kuhlman and Marshello procedure was $1.30.

Subject's choices were converted to scores on four scales, one for each social motive. Each time the subject selected an alternative prescribed by one or more of the social motives, a score of +1 was added to the corresponding scale(s). Again, following Kuhlman and Marshello (1975b), subjects were classified according to their highest scale score, provided that within each type of game at least 50% of their choices were consistent with a single social motive. Partly because of the redundancy between scales, in the present study, 20 subjects made choices that were equally consistent with two social motives. In

such cases, the motive representing the less concern for others' outcomes was assigned. In total 86% of the 270 subjects could thus be classified.

The geometric Decomposed Games procedure. The geometric procedure (see Liebrand, 1984) consisted of 32 two-choice Decomposed Games. The options in these games may be viewed as points in an own/other outcome plane defined by the outcome to self (horizontal axis) and the outcomes to the other (vertical axis). Each of the 32 games consisted of a pair of two adjacent points: 16 equally spaced pairs lay on Circle A and 16 equally spaced pairs lay on Circle B in the own/other outcome plane depicted in Fig. 1. The center of both the circles coincided with the origin of the outcome plane; the radius was \$7.00 for Circle A and \$8.50 for Circle B. An example of a Decomposed Game on Circle B is the choice between the point \$3.30 for self and \$7.90 for the other, versus \$6.00 for self and \$6.00 for the other. For each game, the subjects selected the point they preferred most.

Adding up the chosen amounts separately for self and for other yields an estimate of the weights assigned by the subject to the payoff for self and to the payoff for other. These weights estimate the slope of subject's motivational vector extending from the origin from the self/other outcome plane. All motivational vectors between 112.5 and 67.5° (Fig. 1) were labeled altruistic, vectors between 67.5 and 22.5° were labeled cooperative, those between 22.5 and 337.5° were labeled individualistic, and vectors between 337.5 and 292.5° were labeled competitive. Using the geometric procedure, 98% of the 270 subjects could be classified.

Procedure for the Sequence Dilemma. After subjects had made their choices for both Decomposed Games procedures, they received the instructions for the Sequence Dilemma. Thereafter, a quiz was administered to ensure complete understanding of this task, and any incorrect answers were corrected and explained. During the task, subjects were seated in a circular pattern behind small screens which prevented them from seeing each others' response sheets, while at the same time permitting them to see each other. The structure of the Sequence Dilemma was explained in terms of a conservation of energy paradigm in order to make the abstract characteristics of the task more concrete and realistic.

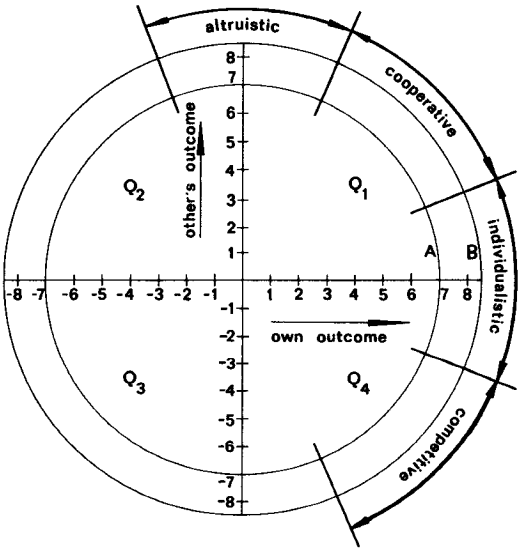

FIG. 1. Own–other outcome space. Q(1) to Q(4) = Quadrant 1 to Quadrant 4; Circle A radius = \$7.00; Circle B radius = \$8.50.

The subjects had to select one of five options at each of five stages. The options involved the consumption of energy which was expressed in monetary units: Option 1: \$9.00; Option 2: \$6.00; Option 3: \$4.50; Option 4: \$3.00; Option 5: \$1.50. No reference was given to the desirability of selecting options in a specific way.

Subjects were told that the stages corresponded to time and that the total amount of energy resource (money) available across the five periods would be \$95, \$100, \$105, \$110, or \$115 (see Fig. 2; for the six-person groups these pool sizes were adjusted to fall between \$80 and \$100). Subjects were informed that each pool size had a probability of .2, and would be randomly determined after the decisions for all five stages had been made. They were told that they were making real monetary decisions and that they would be paid the money they had taken for self, if the total amount chosen in their group did not exceed the pool size drawn.

After each decision-making period, subjects were informed concerning the total amount of money taken. No information was given concerning the amount taken by individual subjects.

RESULTS

The Two Decomposed Games Procedures

There are several ways to estimate the internal consistency of the two Decomposed Games Procedures used to assess the subjects' social motive. First, the percentage of choices consistent with the social motive assigned can be calculated. For the three-alternative Kuhlman and Marshello procedure this percentage is 87; for the two-alternative geometric procedure this percentage is 84. However, making choices in a completely random way results in consistency percentages of 33 and 50, respectively. Since both procedures consist of two parts, the Spearman–Brown index for reliability can be calculated. The Spearman–Brown coefficient for the

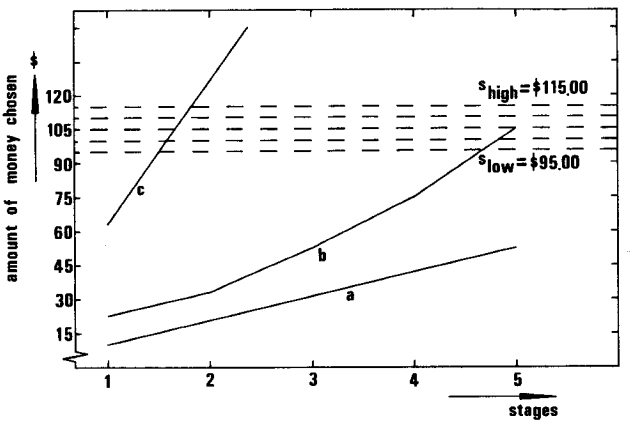

FIG. 2. Possible outcomes for the Sequence Dilemma for seven persons given five stages where the minimal amount of money for each person per stage is \$1.50 and the maximum is \$9.00. a. cumulative minimal amount of money across choosers at each stage; c. cumulative maximal amount of money across choosers; b. possible cumulation curve. S(low). lowest resource pool size; S(high). highest resource pool size.

Kuhlman and Marshello procedure averaged over the four scales is .93 (N = 270); the corresponding index over the two axes for the geometric procedure is .88 (N = 270).

To estimate the convergent validity between the two measures we first computed the correlation between the own outcome weight in the geometric procedure and the I-scale magnitude from the Kuhlman–Marshello procedure (.46), and that between the other outcome weight and the A-scale magnitude, respectively (.54). Both are highly significant, suggesting that the two procedures are measuring similar tendencies.

In Table 2 the proportion of agreement between the nominal scales of both procedures is shown. Using the disagreement weights, 0 (diagonal), 1 (adjacent diagonals), 4 (next diagonals), and 9 (upper right and lower left corner), the weighted κ coefficient (Cohen, 1968), is .54 (95% confidence limits are .45 and .63). The main difference between the classification procedures is that the Kuhlman–Marshello procedure classifies 61 of the subjects as altruists, while the geometric procedure results in only 10 subjects so classified. The latter procedure classified more subjects as cooperative (130) than the former. Of the 10 subjects who were classified as altruistic by the geometric procedure, 9 were also classified that way by Kuhlman–Marshello. This suggests that the main difference between the procedures is that the geometric procedure sets a higher or more stringent criterion than the Kuhlman–Marshello technique for the classification as an altruist. If the altruists and cooperators are combined into a single category, then the agreement between the procedures is extremely high, i.e., 172 of 236 cases or 73% agreement.

Culture Differences in Social Motives

The hypothesis that there are differences in social motives between American and Dutch subjects was analyzed by means of χ^2 tests. The culture × social motive classification is presented in Table 3. The obtained χ^2's provide no support for the cultural differences hypothesis; for the

TABLE 2

CROSS TABULATION OF THE CLASSIFICATIONS PROVIDED BY THE GEOMETRIC PROCEDURE AND THE KUHLMAN AND MARSHELLO PROCEDURE

		Kuhlman and Marshello				
		A	J	I	R	Total
Geometric procedure	A	9	0	1	0	10
	J	48	64	16	2	130
	I	3	29	41	5	78
	R	1	2	5	10	18
Total		61	95	63	17	236

Note. A = altruism; J = cooperation; I = individualism; R = competition.

TABLE 3
CROSS TABULATION OF SUBJECTS CLASSIFIED BY MEANS OF BOTH DECOMPOSED GAMES PROCEDURES, BROKEN DOWN FOR CULTURE

	Altruistic	Cooperative	Individualistic	Competitive	Total
Netherlands	4; 27	53; 37	33; 27	10; 9	136; 126
United States	5; 25	55; 44	35; 26	5; 5	128; 113
Total	11; 63	143; 95	91; 64	19; 17	264; 239

Note. Entries are percentages of row totals; the first one refers to the geometric procedure.

geometric procedure $\chi^2(3, N = 264) = 2.5$ (n.s.), for the Kuhlman–Marshello Procedure $\chi^2(3, N = 239) = 2.9$ (n.s.). In addition, no cultural differences were found in scores on the two continuous variables resulting from the geometric procedure. For American subjects the mean on the variable corresponding to concern for own outcomes is 19.07, while the mean for Dutch subjects is 19.97. The means on the variable corresponding to concern for others' outcomes were 9.92, and 8.07, respectively. A multivariate analysis of variance with the two geometric procedure variables as dependent variables and culture as the between-subjects factor yielded no significant univariate or multivariate effects ($F(2, 265) = 1.57$). To summarize, no differences were found between American and Dutch subjects in the distribution of social motives.

In addition, we examined possible gender differences in the distribution of social motives. No significant differences were obtained: $\chi^2(3, N = 264) = .98$ (n.s.) for the geometric procedure and $\chi^2(3, N = 239) = 5.41$ (n.s.) for the Kuhlman–Marshello procedure. The only noticeable distributional difference was that Kuhlman–Marshello classified as altruistic twice as many females as males (42 vs 21).

Effects of Social Motive, Culture, and Sex on Choices in the Sequence Dilemma

In the analysis of the effect of culture and social motive on subjects' resource choices, the variation due to differences between the 40 decision-making groups (MS–A), and the groups × social motive interaction (MS–AB), were found to yield F ratios failing to reach the .10 level of significance. Consequently, in the partially hierarchical design in which groups were nested within culture (Winer, 1962, p. 184), the MS–A and MS–AB were pooled with the within-groups mean square to create a pooled error term. The resulting test yielded a significant effect for social motives, both when the geometric procedure was used ($F(3, 256) = 4.77$, $p < .05$), and with the Kuhlman and Marshello procedure ($F(3, 231) = 5.67$, $p < .05$). The effect for culture and the culture × social motive interaction were insignificant and accounted for virtually no variance.

As can be seen in Table 4, altruistic subjects took the smallest amount

TABLE 4
RESOURCE CHOICES BROKEN DOWN FOR SOCIAL MOTIVE AND CULTURE, SEPARATELY FOR THE GEOMETRIC PROCEDURE (GP) AND FOR THE KUHLMAN–MARSHELLO (K&M) PROCEDURE

	Social motive			
Culture	Altruism	Cooperation	Individualism	Competition
Netherlands				
GP	12.90	13.89	15.90	16.50
K&M	13.06	14.90	16.50	15.00
United States				
GP	13.50	13.89	15.26	17.50
K&M	13.14	14.29	15.85	18.30

of money, followed by the cooperators, next the individualists, while the competitors took the most. There is only one exception. It concerns the Dutch competitors classified by Kuhlman and Marshello's procedure.

The average amount of money chosen by the Dutch subjects was \$14.73 (SD = 4.19), while the American subjects on the average chose \$14.63 (SD = 4.82). An additional 2 × 2 univariate analysis of variance of the amount chosen, with culture (Neth.–U.S.) and sex as the two between-subjects factors, yielded no main effect for culture ($F(1, 266) = .004$), nor a culture × sex interaction ($F(1, 266) = .008$). The main effect for sex was significant ($F(1, 266) = 5.97$, $p < .05$). Males chose \$15.42 for self but females chose only \$14.08. Thus, in the present research it appears that females behave in a less self-interested way in a simulated social dilemma than males.

Resource Choices Per Stage

Subject's resource choices per stage as a function of social motive collapsed over culture are shown in Fig. 3. The five separate choices were analyzed using an analysis of repeated measures model (Finn & Mattson, 1978), with social motive classification as the between-subjects factor and stages as the within-subjects variable. Of the four polynomials only the linear trend ($F(1, 260) = 264.38$, $p < .0001$) and the quadratic trend ($F(1, 260) = 39.13$, $p < .0001$) yielded significant univariate and multivariate effects ($F(2, 259) = 134.10$, $p < .0001$) for the geometric procedure. The results for Kuhlman and Marshello's procedure were the same. As is shown in Fig. 3, the resource choices of all subjects decreased most during the first three trials, while there is only a small decrease after the third trial. Furthermore, the linear trend × social motive interaction was significant ($F(3, 260) = 6.03$, $p < .0006$, geometric procedure; $F(3, 235) = 3.86$, $p < .01$, Kuhlman–Marshello procedure). It appears that social motives are most influential when resources are plentiful. At

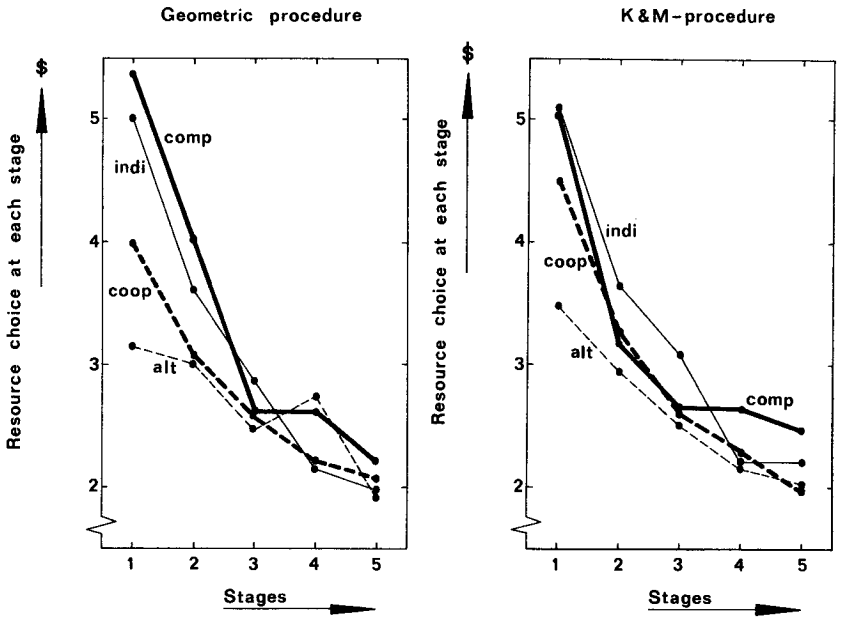

FIG. 3. Resource choices for four classes of social motivation × stage separately for the geometric procedure and for Kuhlman and Marshello's procedure; COMP = competitive, IND = individualistic, COOP = cooperative, ALT = altruistic.

stage 1, the differences between the four social motives are significant ($F(3, 260) = 7.8$, $p < .001$, geometric procedure; $F(3, 235) = 7.5$, $p < .001$, Kuhlman–Marshello procedure). At stage 5, however, there is no significant social motive effect for either procedure. It seems that as subjects approached the point at which they could lose everything, they became more conservative. However, there is no indication that competitive and individualistic subjects tried to compensate in this phase of the game for their excessive choice behavior in the first trials.

The amount of money chosen as a function of stage of decision making, broken down for culture and for sex, is shown in Fig. 4. The five resource choices made by each subject were analyzed using a 2 × 2 analysis of repeated measures model (Finn & Mattson, 1978), with culture and sex as the two between-subjects factors and stages as the within-subjects variable. Aside from the significant univariate effect for the linear trend ($F(1, 266) = 251.4$, $p < .0001$), for the quadratic trend ($F(1, 266) = 35.11$, $p < .0001$), and for their multivariate effect ($F(2, 265) = 126.7$, $p < .0001$), only the first two polynomials × culture interaction ($F(2, 265) = 8.65$, $p < .05$), was significant.

The polynomials × culture interaction was analyzed in further detail by comparing the proportion of the total effect variance (i.e., the variance

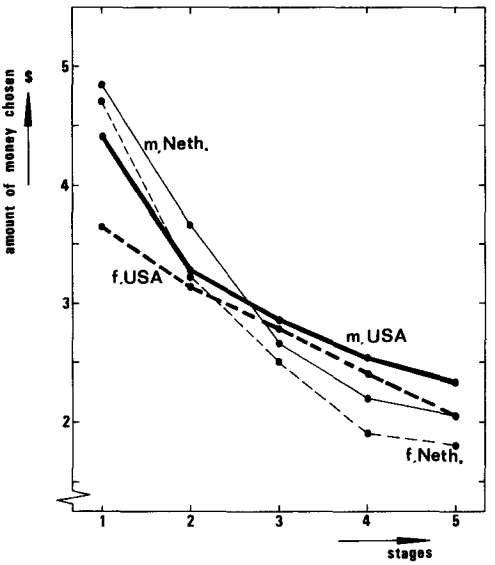

FIG. 4. Average amount of money chosen for self by stage, sex (male vs female), and culture (Netherlands (Neth.) vs United States (USA)).

of the average choice for each stage) accounted for by the linear and quadratic polynomial separately for each culture (Keppel, 1973). It appeared that for the Dutch subjects the linear polynomial accounted for 89% and the quadratic polynomial for 10% of the total effect variance. For the American subjects, these proportions were 96 and 3%, respectively. It seems that the Dutch subjects took somewhat more than the American subjects in the beginning of the Sequence Dilemma and that toward the end of the game they were more conservative than the American subjects.

DISCUSSION

Social Motives

The expectation that individual differences in social motives would be related to choices in a social dilemma was strongly supported. The game format used in the present study allowed subjects to compare their own behavior with that of others. It appears that competitive and individualistic subjects, while receiving information from which they could deduce that they were taking more out of the common pool than the others in their group, did not reduce their takings to such an extent that they could compensate for their excessive takings in the beginning of the game. The cooperative and altruistic subjects took somewhat less than the average other in their group. With respect to both the *n*-person game format and the subject populations under consideration, this finding is an important extension of Kuhlman and Marshello's (1975) research on social motives.

One question raised by Messick et al. (1983) is relevant to the present findings. It concerns whether the observed differences between social motives in social dilemma behavior reflect differences in a priori expectations of reciprocity and differences in beliefs about how one should use a common resource. As was said before, there is some evidence (Kelley et al., 1970) that interdependency situations may be differently defined by the subject. It can be interpreted as a situation in which one could behave in either a "good" or "bad" way (evaluative meaning) or in which one could behave in either a "strong" or "weak" way (dynamism meaning). A study currently in progress investigates whether the above differences in the definition of the interdependency situation are related to social motives.

Prior research has indicated the existence of systematic preferences for particular distributions of outcomes to self and other (Knight, 1981; Kuhlman & Marshello, 1975; Liebrand, 1983; McClintock, 1972). The present study also provides support for the convergent validity of the two social motive assessment procedures used in prior research. However, both procedures rely heavily on the same kind of behavioral choice methodology (Knight, 1981). Consequently, the corresponding findings may be method specific. In order to overcome this limitation, future research should establish their correspondence with other types of social motive methodologies.

Gender Differences

As in the two-person mixed-motive gaming research, we find inconsistent sex effects. In both the present study and the Liebrand (1984) study it was found that females chose less for self than males in the Sequence Dilemma; however, there were no significant differences in the distribution of social motives. In addition, Caldwell (1976) found no sex effect in a five-person Prisoner's Dilemma in which subjects played for points, and Dawes, McTavish, and Shaklee (1977) found that females were more likely to cooperate in only one of the reported commons dilemmas in which they could earn real money. A tentative conclusion might be that females are more cautious than males in *n*-person mixed-motive games in which they can earn or lose real money.

Cultural Differences

Contrary to the expectations based on the studies of Kelley et al. (1970), Kerlinger et al. (1976), Kerlinger (1978), and those depicted in Table 1, no indications of cross-cultural differences were found with regard to the distribution of social motives or to the amount taken in the Social Dilemma Game. It is clear that differences in social milieu, as well as differences in experimental procedures or in subject recruitment procedures could account for the cultural differences obtained in prior

research. The design of the present study permits a less ambiguous interpretation. Since experimental and recruitment procedures were carefully equated, we may conclude that those aspects of the culture responsible for shaping undergraduate's social motives do not seem to differ from Santa Barbara to Groningen. Hence, the cultural differences evident in the studies in Table 1 are most likely artifactual, resulting from differences in measurement and/or recruitment procedures.

First, the differences in experimental procedures between the American and Dutch studies in Table 1 concern the type of Decomposed Games procedures used. The differences between the methods is clearly evident in Table 3. Within both cultures, the Kuhlman–Marshello procedure classifies more subjects as altruistic and fewer subjects as cooperative than the geometric procedure. Thus, when methods are crossed with cultures we find that it is the methods, not the cultures, that are crucial.

The second source of bias consists of differences in recruitment procedures. In all the American studies listed in Table 1, subject participation served as a partial fulfillment of an experimental participation requirement. In contrast, in the present experiment, subjects were paid volunteers. Consequently, there are differences with respect to incentive and to the act of volunteering. Rosenthal and Rosnow (1969) point out that volunteers more often than nonvolunteers tend to be approval seeking, authoritarian, and sociable. Though students required to serve as research subjects cannot be considered nonvolunteers—they often have a choice among alternative experiments—they cannot be considered true volunteers. In terms of social motives, it might be that paid volunteers will have more concern for others than subjects fulfilling course requirements. With respect to the kind of incentive received, Kelley et al. (1970) point out that the money incentive for the subjects of the present experiments may have evoked a different definition of the experimental task with a corresponding difference in the behavioral norms considered to be appropriate. In their experiment they found that subjects within the money condition rated both self and the typical person as more honest and cooperative than did subjects within the points condition.

More direct evidence that subject recruitment procedures affect the distribution of social motives obtained comes from the results of a pilot study conducted in Santa Barbara shortly before we carried out the present experiment (van Run, 1982). In that study, 71 undergraduates participated to fulfill course requirements. The average score on the variable corresponding with concern for others' outcomes, as measured by the geometric procedure, was about one half as great in the pilot study as in the Santa Barbara condition of the present experiment ($t(200) = 2.87$, $p < .05$). There was no significant difference in average score on the variable concern for own outcomes between the two groups. Still

the general implication of these results is that what appear to be cultural differences may in fact be due to minor procedural differences.

The results of this study allow us to place great confidence in the relationship we reported between choice behavior in the social dilemma and social motives. The relationship was found both in the United States and in The Netherlands and it was found with both methods of measuring social motives, despite their clear differences.

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